

Title: FIRELIGHT REFLECTIVE SYSTEM AND METHOD

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Claim of Priority

[0001] The present invention claims priority based upon U.S. Provisional Patent Application No. 60/510, 839, filed September 30, 2003, and U.S. Provisional Patent Application No. 60/510,839, filed December 1, 2003, both of which are hereby incorporated by reference.

Field of Invention

[0002] The present invention relates generally to systems for use within a gas-burning or wood-burning firebox or fireplace, and more particularly, to a firelight reflective system and method which, in one embodiment, is coupled into and attachable within a firebox, fireplace or like enclosure to provide a multi-dimensional view of the fireflame from any angle adjacent to the fireplace.

Background of the Invention

[0003] People enjoy the comfort and ambience of a fire, either generated by gas, by wood or by electric means, within a fireplace or firebox. Fireplaces provide warmth and create a certain ambience within a room enjoyable by all. Fireplaces have become a common commodity in new home buildings, often containing at least one fireplace and perhaps more. Numerous remodeling projects also include the installation of a new fireplace or firebox. While

fireplace owners enjoy gazing at the dancing fire within such fireplaces, the fireplace owner does not typically gaze upon the interior walls of the fireplace because such interior walls are dark, barren and void of any design. Moreover, some fireplaces include a smoked or frosted glass which prohibits an owner to fully appreciate the flames within the fireplace. Because of this, fireplace owners cannot enjoy the full aesthetic value of the fire flamelight within the fireplace.

[0004] Numerous prior patents attempt to recreate the aesthetic value of a flamelight by artificial means. For example, U.S. Patent Publication No. 2003/0110671 A1 (publication date: June 19, 2003, to Hess) discloses a flame simulating assembly having a light source (i.e., light bulb), a fuel bed and a reflector. The reflector in this publication is disclosed to reflect light from the light source onto the fuel bed to simulate burning embers below the light source. The reflector, however, is not coupled to any portion of the interior walls of the fireplace, but rather, is disposed in front of the simulated fuel bed. This embodiment fails to appreciate the light that may reflect from the interior walls of the fireplace. Moreover, the reflector is described as transmitting light to a partially reflective screen, which means that the viewer of the fireplace does not enjoy the total amount of light created in the fireplace. Additionally, the reflector described in this disclosure, because of its highly mechanical nature, can only be used with the particular flame simulator described and cannot be combined and/or retrofitted into a gas or wood burning fireplace. For example, the reflector must be positioned in relation to the simulated fuel bed. Additionally, it is well known in the art that an electrical light source does not provide the same ambience as a real flame. The same or similar concerns regarding other flame

simulating devices, such as disclosed in U.S. Patent No. 3,699,697 to Painton and U.S. Patent No. 5,642,580 to Hess *et al.*, exist.

[0005] U.S. Patent No. 3,994,275 to Williams discloses a disposable fireplace reflector adapted to collect and dispose of burnt embers from a wood burning fireplace. The apparatus is disclosed to comprise a single unit construction having a wide variety of fold and perforated lines for use in different sized wood burning fireplaces. The apparatus is further disclosed as being lined with aluminum foil (which is not a good reflector of an actual flamelight image) and may have optional fire-retardant substrates such as asbestos, impregnated cellulosic materials and the like (which will retard any flamelight image even further). Additionally, a wood burning fireplace would likely coat the interior surface of this apparatus with soot, thereby requiring constant cleaning or disposal of the apparatus.

[0006] In view of the foregoing, there is a need for a low-cost, flamelight reflective system, method or apparatus which will allow a viewer to further appreciate the aesthetic value of the fire flamelight within a fireplace, firebox or like structure, whether new or existing, from any viewable angle. The present invention satisfies this need. The present invention provides a owner of the fireplace a simple, realistic, easy to install system for providing a multi-dimensional view of the fire within the fireplace.

Summary of the Invention

[0007] The following summary of the invention is provided to facilitate an understanding of some of the innovative features unique to the present invention, and is not intended to be a full description of variations that may be

apparent to those of skill in the art. A full appreciation of the various aspects of the invention can be gained from the entire specification, claims, drawings, and abstract taken as a whole.

[0008]

The present invention is a firelight reflective system insertable within, or permanently attachable to, one or more interior surfaces of a fireplace or a firebox. The present invention is, in one embodiment, one or more sheets of a light or image reflective material (such as, for example, high tempered or polished mirrored glass) which are measured to substantially fit one or more of the interior walls of a firebox. In one example, the mirrored glass has a viewable surface and a coupling surface. A fire-proof adhesive is placed upon the coupling surface to couple or otherwise securely attach the mirrored glass to one of the corresponding interior surfaces of the firebox. In another embodiment, each sheet of glass mirror takes up substantially the same surface area as one or more of the interior surfaces of the firebox.

[0009]

The novel features of the present invention will become apparent to those of skill in the art upon examination of the following detailed description of the preferred embodiment or can be learned by practice of the present invention. It should be understood, however, that the detailed description of the preferred embodiment and the specific examples presented, while indicating certain embodiments of the present invention, are provided for illustration purposes only because various changes and modifications within the spirit and scope of the invention will become apparent to those of skill in the art from the detailed description, drawings and claims that follow.

Brief Description of the Drawings

[0010] The accompanying figures further illustrate the present invention and, together with the detailed description of the preferred embodiment, assists to explain the general principles according to the present invention.

[0011] FIG. 1 is a side perspective view of one embodiment of the present invention within a firebox, this embodiment comprising light or image reflective material being fittable within a firebox to cover substantially all of the vertical surfaces of the firebox;

[0012] FIG. 1a illustrates an exemplary coupling system between the present invention and a firebox surface according to one aspect of the present invention;

[0013] FIG. 2 illustrates a front plan view of FIG.1;

[0014] FIG. 3 illustrates another front plan view of FIG.1;

[0015] FIGs. 4 illustrates a side perspective view of another embodiment of the present invention where the present invention comprises a series of light or image reflective material fittable within a firebox to cover selected portions of the vertical surfaces of the firebox;

[0016] FIG. 5 illustrates a front plan view of FIG. 4;

[0017] FIGs. 6 illustrates a side perspective view of another embodiment of the present invention where the light or image reflective material encompasses a substantial portion of the vertical surfaces of the firebox; and

[0018] FIG. 7 illustrates an exemplary front plan view of FIG. 6.

[0019] Additional aspects of the present invention will become evident upon reviewing the non-limiting embodiments described in the specification and the claims taken in conjunction with the accompanying figures, wherein like reference numerals denote like elements.

Detailed Description of the Preferred Embodiment

[0020] The present invention is directed towards, in one embodiment, a fire-reflective system insertable within, or permanently attachable to, one or more interior surfaces of a fireplace or a firebox. The present invention comprises, in one embodiment, one or more sheets of a light reflective material (such as, for example, high tempered mirrored glass) which are measured to substantially fit one or more of the interior surface of a firebox, and which are coupled to one or more interior surface walls of the firebox. The fireplace is generally described as a fire resistant structure having three vertical walls, a bottom surface and a ceiling (not illustrated, but well known to those of skill in the art) forming a cavity within which a fire may be built. As will be understood herein, the terms "fireplace", "firebox", "cavity", "chamber" and/or "enclosure" generally refer to any structure that fully or partially surrounds a fire flame, and is not intended to be limited to any structure used in residential fireplace constructions but can be used in any number of structures used to generate flames (whether free standing, framed in, insert, etc.). Thus, for example, one embodiment of the present invention may be applied to an outdoor fireplace in a commercial setting.

[0021] Referring now to FIGs. 1 - 3, a firebox 100 is illustrated. The fireplace includes at least one or more interior vertical surfaces or walls A, B, C defining an interior chamber 13 which houses a fire flamelight producing element 15. The fire producing element 15 generates and maintains one or more fire flames within the chamber 13. In one embodiment, the fire producing element 15 may produce flames through natural gas, electric bulbs, plasma discharge or through

like types of flame simulators. In another embodiment, the fire producing element 15 may include coal, compacted paper or wood. The chamber 13 may be defined within the fireplace or by another structure, such as for example a wall of a building or home.

[0022] As illustrated in FIGs. 1 - 3, in one example, the present invention is a fire flamelight reflective system 10 comprising at least one light or image reflective material 11_n having a light or image reflective viewable surface 11a and a coupling surface 11b (as seen in FIG. 1a). In one embodiment, the light reflective surface 11a comprises a mirrored glass substrate having a polished surface optimized for light or image reflectivity while diminishing any light or image scattering. In one embodiment, the mirrored glass has an approximately flat substrate surface. In still another embodiment, the light reflective surface is formed upon the glass by an aluminum coating, glass and polish. The viewable surface 11a is adapted to reflect an image (such as a firelight flame generated by fire producing element 15) generated from within the fireplace, so that the viewable surface acts like a mirror wherein images emitting or reflecting light within the firebox will reflect off of the viewable surface so that the angles of incidence and reflection are substantially or exactly equal to a viewer of the fireplace.

[0023] A firebox coupler is placed upon the coupling surface 11b to couple or otherwise securely attach the light or image reflective material 11_n to one of the corresponding interior surfaces A, B or C of the firebox. For example, a representative firebox coupler may include a fire-proof or heat resistant adhesive. Those of skill in the art will recognize that other coupling technologies exist which are conducive to coupling the image reflective substrate to one or

more walls of the firebox, including by hooks, anchors, wires, hook and loop fasteners or other predetermined fasteners. The choice of how the image reflective substrate is coupled to any firebox surface is merely a design choice, which will allow the image reflective substrate to either be removably securable within the firebox or permanently attached. Those of skill in the art will also realize that the present invention may be attached to either a ceiling or bottom surface of the firebox and remain within the scope of the present invention, however, the viewing angle for these surfaces is likely limited.

[0024]

In one embodiment, as seen in FIGs. 1 – 3, each sheet of light or image reflective material 11_n couples to and takes up substantially the same surface area as one or more of the interior surfaces A, B or C of the firebox. In another embodiment, as seen in FIGs. 4 - 5, one or more sheets of light or image reflective material 20_n (such as, for example, smaller mirror tiles or other designs crafted) can be coupled in different arrangements within the firebox. While the designs in FIGs. 4 – 5 are illustrated as being diamond-shaped, those of skill in the art will realize that any suitable plurality of designs, whether the same shape or different shape, can be crafted. In still another embodiment as illustrated in FIGs. 6 - 7, the image reflective substrate 30_n is coupled to and takes up a portion of the surface area as one or more of the interior surfaces of the firebox, but not completely.

[0025]

The physics of light or image reflection is well known in the art. For example, if a ray of light or an image approaches, and then reflects off of a mirror, the ray of light approaching the mirror is known as the incident ray while the ray of light which leaves the mirror is known as the reflected ray. At the point of incidence where the ray strikes the mirror, a line can be drawn

perpendicular to the surface of the mirror; this line is known as a normal line (labeled N in the diagram). The normal line divides the angle between the incident ray and the reflected ray into two equal angles. The angle between the incident ray and the normal is known as the angle of incidence. The angle between the reflected ray and the normal is known as the angle of reflection. The law of reflection states that when a ray of light reflects off a surface, the angle of incidence is equal to the angle of reflection. When a person views an image reflected from the mirror, the light (or image) which travels along the line of sight to one's eye follows the law of reflection. In accordance with one embodiment of the present invention, the light or image reflective material is placed within the vertical surfaces A, B, C of a firebox to obtain optimized viewing of the fireflame through the laws of reflection.

[0026]

The present invention may be embodied as a system, method, an apparatus or a device. Other variations and modifications of the present invention will be apparent to those of ordinary skill in the art, and is not limited except by the appended claims. The particular designs and configurations discussed above can be varied, and are cited to illustrate particular embodiments of the present invention. It is contemplated that the use of the present invention can involve components having different characteristics as long as the principles disclosed herein are followed.